Pollution Protection Study

ACTIVE CONCEPTS LLC
107 Technology Drive, Lincolnton | NC 28092 USA
• info@activeconceptsllc.com • Phone: +1-704-276-7100 • Fax: +1-704-276-7101 • https://activeconceptsllc.com/

Tradename: AcquaSeal® Algae

Code: 20852

CAS #: N/A

Test Request Form #: 6261

Lot #: N200117D

Sponsor: *Active Concepts, LLC; 107 Technology Drive Lincolnton, NC 28092*
Study Director: *Maureen Danaher*
Principal Investigator: *Kara Rivera*

Test Performed:
Pollution Protection Study

Introduction

The role of pollution in the appearance of premature wrinkles and age spots has become a new frontier in antiaging active ingredients. While we have known about the harmful effects of pollution on our health for years, new research indicates air pollution plays a detrimental role in extrinsic aging. Carbon and metal micro particles found in polluted air embedded in the dermis cause oxidative stress, initiate inflammatory cascade leading to the breakdown of collagen, elastin, and other structural components in the skin. Additionally, polyaromatic hydrocarbons overstimulate the aryl hydrocarbon receptors on keratinocytes and melanocytes resulting in hyperpigmentation and the appearance of age spots. Providing a physical barrier will prevent embedment of carbon particles, thus reducing the signs of extrinsic aging.

Accordingly, a Carbon Pollution Protection Study was conducted to assess the ability of **AcquaSeal® Algae** to provide immediate barrier protection from carbon air pollution and enhance the removal of carbon air pollution.

Study Principle

Products are applied to the skin and micronized charcoal is applied on top. The micronized charcoal used has a particle size of 2.5 microns (PM 2.5) or less that mimics the small particulates found in polluted air. Pictures of the charcoal are analyzed for the amount of carbon on the skin before and after a washing procedure to determine the amount of carbon present on the skin.

Materials

A. **Equipment:** Dino-Lite Digital Microscope; Pipettes
B. **Reagents:** Base Lotion (Cetaphil® Moisturizing Cream for All Skin Types); Micronized activated charcoal; Deionized water
C. **Other:** Disposable pipette tips; Wash bottles

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Methods

Volunteers between the ages of 23 and 45, who were known to be free of any skin pathologies participated in this study.

Three randomly designated test sites were identified on the volar forearm and assigned a condition (Table 1). The skin test site conditions and treatments are described below (Table 2). The Base Lotion utilized in this study was Cetaphil® Moisturizing Cream for All Skin Types. After participants applied 0.2 g of each treatment to the assigned test site, the lotion were allowed to dry completely. Participants applied 5 mg of micronized charcoal on top of each test site and initial images were obtained. After each test site was washed 5 times with deionized water, images were obtained again.

Table 1. Descriptions of the Conditions and Treatments for each Skin Test Site

Skin Test Site	Condition	Treatment / Test Article Application Description
1	Untreated Control	None
2	Base Lotion	Base Lotion
3	5.0% Retinol	5.0% Retinol in Base Lotion
4	5.0% **AcquaSeal® Algae**	5.0% **AcquaSeal® Algae** in Base Lotion

ImageJ was utilized to determine color intensity from the captured images. The histogram results are presented as shifts in light intensity. The left side of the histograms indicate more dark light intensity, whereas the right side of the histograms indicate more lighter intensity. The percent change in histogram light intensity was calculated for each test site using the following equation:

$$Percent\ Change\ (\%) = \frac{Light\ Intensity_{After\ Wash} - Light\ Intensity_{Before\ Wash}}{Light\ Intensity_{Before\ Wash}} \times 100$$

Results

The data obtained from this study met criteria for a valid study as the Untreated Control, Base Lotion, and Retinol performed as anticipated. Application of 5.0% **AcquaSeal® Algae** demonstrated effective anti-pollution properties by preventing the accumulation of carbon on the skin.

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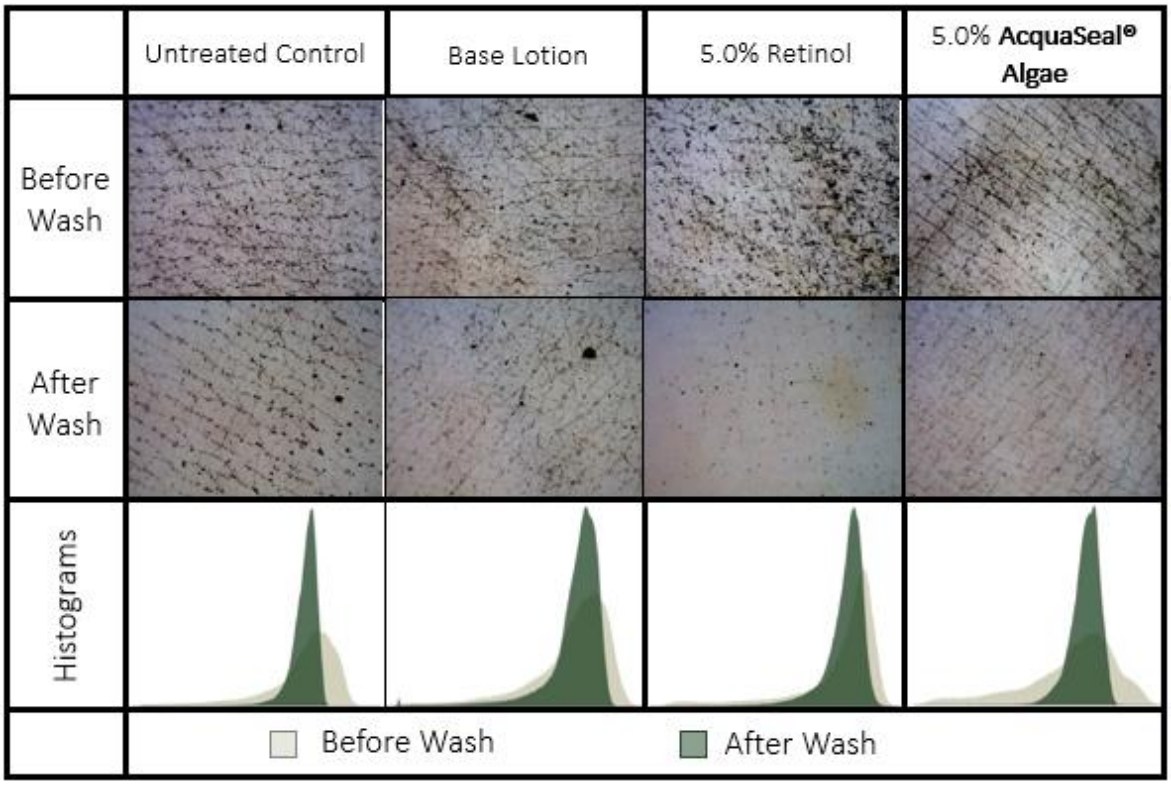

Figure 1. Images of each treatment site before and after washing with light intensity histograms of each site before and after washing

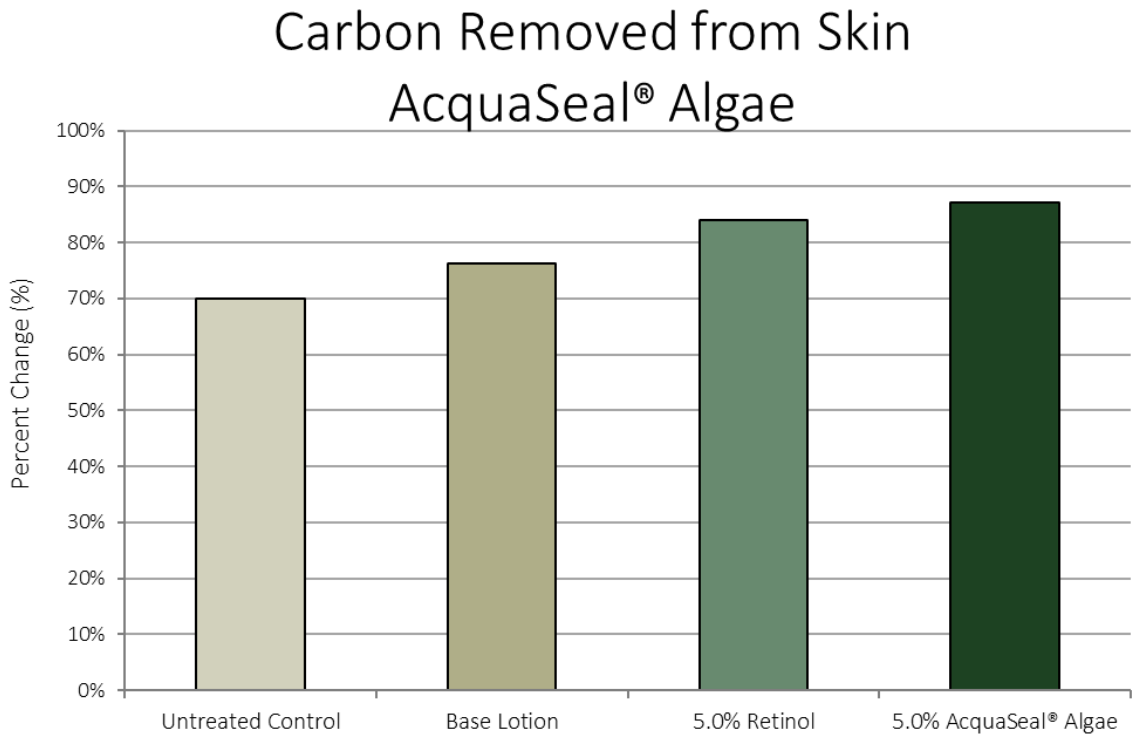

Figure 2. Carbon Removed from Skin After Washing

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Discussion

The results from this study demonstrate 5.0% **AcquaSeal® Algae** provides carbon pollution protection as specified by micronized carbon residue. After carbon application, there was visibly less carbon present on the site treated with 5.0% **AcquaSeal® Algae** compared to the Untreated Control, Base Lotion, and 5.0% Retinol test sites (Figure 1). Histogram analysis confirmed this lack of carbon accumulated on the skin via a smaller peak on the left which indicates the product was able to prevent the pollutant from depositing on the skin (Figure 1).

After washing, the test site treated with 5.0% **AcquaSeal® Algae** visibly appeared cleaner compared to the Untreated Control, Base Lotion, and Retinol test sites, indicating less carbon was present on the skin (Figure 1). Histogram analysis confirmed 5.0% **AcquaSeal® Algae** reduced carbon on the skin by 87%, whereas Untreated Control, Base Lotion, and 5.0% Retinol exhibited reductions of 70%, 76%, and 84%, respectively (Figures 1, 2).

Taken together, these results indicate **AcquaSeal® Algae** provides anti-pollution properties when added to personal care applications at recommended use levels. Collectively, **AcquaSeal® Algae** reduces carbon accumulation on the skin and enhances carbon removal from the skin which improves the skin's protective barrier function and contributes to the appearance of healthier looking skin.